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Anxiety, Uncertainty, and Resilience of Medical Students Worldwide during the COVID-19 Pandemic

Mohammad Abdullah Sarkar and Ahmad Ozair

Abstract

The COVID-19 pandemic significantly impacted medical education worldwide. While healthcare professionals labored to ensure proper care for COVID-19 patients, medical students suffered from high rates of anxiety, uncertainty, burnout, and depressive symptoms. Whilst students in the pre-clinical phase of education faced disruption of didactic lectures and laboratory training, senior medical students faced uncertainty regarding their clinical rotations and internships, which are vital for practical exposure to healthcare. Several studies across the world demonstrated that clinical learning was significantly affected, with students in many countries completely cut off from in-person rotations. The disruption of the clinical curriculum coupled with a sense of failure to contribute at a time of significant need often led to despair. Reforms proposed and/or implemented by governments, medical advisory boards, medical schools, and other administrative bodies were felt to be insufficient by the medical student fraternity at large. Consequently, these students continue to face high rates of anxiety, depression, and a general sense of cynicism. In this student-authored perspective, we highlight the challenges faced by and the psychological impact on medical students directly or indirectly from the pandemic.

Keywords: medical education, medical student, clinical training, pre-clinical education, COVID-19, resilience, burnout, depression, mental health

1. Introduction

The COVID-19 pandemic saw nations worldwide in a crisis. Various countries adopted different measures to confront the pandemic, and most of them focused on social distancing and quarantining. Governments, both federal and local, enacted several public health interventions, including restrictions on movement outside homes. Quarantining of exposed healthy individuals, usually for two weeks, according to the World Health Organization (WHO) guidelines, was done. These restrictions also included the prospect of self-isolation, where an infected individual would restrict their own movement.

The impact of such drastic measures was expectedly unpleasant to the human mind. Aristotle's notion of man being a social animal has been well-received by the general public and represents the rare occurrence where a philosophical idea is

accommodated into general conversation. Thus, the cessation of live social interaction was bound to have drastic consequences for the well-being of a person's mind. Even before COVID-19, pandemics have been responsible for divorces, suicides, and litigations alike [1]. Quarantining has also been linked with various problems such as the development of acute stress disorder, increased irritability, and even the development of post-traumatic stress disorder. People who were quarantined because of Severe Acute Respiratory Syndrome (SARS) reported a wide variety of emotions, predominantly fear, nervousness, and sadness. In a similar vein, social distancing may promote engagement with negative thoughts and urge people to focus on their helplessness [1].

Therefore movement restrictions related to the pandemic, despite all their benefits, did have multiple and sometimes unintended consequences, for various strata of the population. While healthcare workers worked longer hours and in circumstances that put their own lives in danger, one other notable community that in particular was impacted was of the medical students. In this chapter, we explore how physicians-in-training worldwide suffered from the damage done to their education. While lectures and laboratory training of students completing their pre-clinical curriculum were disrupted, those who were doing their clinical rotations suffered from a lack of practical training in patient care. In addition, those students who were supposed to graduate in 2020 faced disruption of their academic timeline. As the pandemic continues, medical students worldwide remain distressed.

2. Defining the impact of COVID-19 on medical students

As evidenced by the consequences of previous natural disasters along with the studies done in the current pandemic, the extent of the psychosocial impact of the current crisis on medical students was significant. In the following sections, we will explore the various experiences medical students underwent.

2.1 Clinical rotations and clerkships

"He who studies medicine without books sails an uncharted sea, but he who studies medicine without patients does not go to sea at all"

- Sir William Osler

The medical curricula cater to the multifaceted development of a safe and competent physician. As part of their curriculum, medical students learn clinical skills, decision-making, and hands-on patient care. These are accomplished via clinical rotations and clerkships which also help them choose their residency specialty after exploring the various specialties.

Additionally, in many countries such as the United States (US) and Canada, while applying to certain residency specialties, medical students do 'away rotations' where they perform rotations at another hospital; this also offers a way to decide whether they will pursue their residency from the 'away' institute [2].

The COVID-19 pandemic disrupted this clinical education significantly, causing much upheaval amongst the students. Many medical schools chose to halt clinical rotations entirely were halt. For some, this was primarily driven by a shortage of personal protective equipment (PPE). For others, it was driven by the rapid spread of the virus which forced staff members to solely focus on patient care. The Association of American Medical Colleges (AAMC) issued a guideline on March 17, 2020, seeking the closure of clinical rotations in medical colleges across the United States because the distribution of PPE to medical students would compromise their delivery to frontline clinicians [2]. The Coalition for Physician Accountability, a

wide-ranging group comprised of representatives from various regulatory bodies in the United States announced on April 14, 2021, the recommendation of closing all rotations till the end of the academic year [3]. The CPA's recommendation was duly adhered to, given that its members included the AAMC, the American Association of Colleges of Osteopathic Medicine (AACOM), the Federation of State Medical Boards (FSMB), the National Board of Medical Examiners (NBME), the National Board of Osteopathic Medical Examiners (NBOME), American Board of Medical Specialties (ABMS), Accreditation Council for Graduate Medical Education (ACGME) amongst others. Similar recommendations were issued in Canada by the Association of Faculties of Medicine of Canada (AFMC) [4].

Medical students were reasonably anxious about the impact of incomplete clinical rotations on their future careers. The halting of rotations meant that there was no viable implementation of the practical skills essential for the development of competent physicians [5]. Another worry besides the competence of future physicians was the students' perception of the same. Regardless of the measures undertaken by various medical colleges to alleviate competence concerns, the lack of clinical experience led to 'imposter syndrome' being fostered in medical practitioners where they did not feel ready to be a physician [6].

2.2 Self-isolation and quarantine

Medical students had to self-isolate and quarantine themselves as per their country's guidelines and were expected to maintain their composure. The students reported that serving at the frontline was their personal responsibility, though it was considered a voluntary task [5]. They had to remain within the confines of their residence without their usual support network that had been previously available in the form of educational settings and peer groups. Considering the aggravating effects of the pandemic guidelines on the mental health of medical students, it is essential to focus on their quarantine experience.

While self-isolation and quarantine themselves had a significant toll on the well-being of medical graduates, the students were also affected by the sudden burst of information through social media [6]. Social media influenced medical students, similar to other populations, about the origins of COVID-19 and the effectiveness of subsequently developed vaccines [6].

Medical students across the UK leveraged their friends and family to counter the adverse effects of the ongoing situation. However, they were a vulnerable group during the pandemic, and failure to take cognizance of the same is expected to result in fewer doctors taking up clinical practice in the future. Furthermore, with increased baseline levels of anxiety and burnout, adverse situations are expected to have aggravated students' mental distress, as evidenced by past spreads of infectious [1].

Medical students were at an increased risk of developing eating disorders during the pandemic as they turned to food for reducing their academic and emotional stressors [6]. In addition, food disorders may have indirectly put them at a higher risk of contracting COVID-19 by leading to a weakened immune system, either through starvation periods or through the associated . obesity [6].

The situation appeared to be milder for those pursuing their pre-clinical studies, but they faced different challenges, which we shall discuss in an upcoming section.

2.3 Financial difficulties of medical students

The COVID-19 pandemic proved to be a financial burden on people world-wide as they dealt with budget cuts, mass-employment cuts, and suspension of

welfare services. Financial problems have been linked to mental problems in the general population [6].

Graduation generally entails various job opportunities for medical graduates along with subsequent financial security. The students look forward to securing a position in residency programs or other academic avenues to pay off their student loans, establish or maintain their family, prepare for upcoming ventures, etcetera. However, in many countries, COVID-19 disrupted such plans. Even the welfare plans initiated by governments to ensure the well-being of physicians did not extend themselves to medical students, leaving them in an unaddressed position altogether [6]. Such students did not receive the same compensations as those who had lost their jobs or suffered losses in their businesses; they remained unrepresented in various welfare schemes developed for physicians.

The medical students could have handled financial difficulties by undertaking odd jobs, but the pandemic led to many small-scale businesses closing their operations. In addition, the uncertainty regarding admission tests such as USMLE and MCAT posited a threat to tutoring services, which were financially lucrative for medical students, as medical aspirants remained unsure about their future [7].

2.4 Exam rescheduling and cancelation

In light of the pandemic, standardized exams had to be either rescheduled or canceled in many countries worldwide. While theoretical examinations could be rescheduled with restrictions at exam centers in place, clinical skills examinations suffered greatly.

The US Medical Licensing Examination, which consists of Step 1, Step 2 Clinical Knowledge (CK), Step 2 Clinical Skills (CS), and Step 3, faced major scheduling challenges during the pandemic, which significantly impacted students. The exam-conducting authority Prometric faced difficulties ensuring that the tens of thousands of students who sit for the exams each year find suitable exam centers. This led to immense anxiety in medical graduates as they scrambled to find spots close to them. Many medical students across the world traveled to different cities and some even to different countries in order to find open test centers.

Amongst the USMLE exams, the clinical skills assessment of Step 2 CS suffered the greatest. It had to be canceled by the National Board of Medical Examiners (NBME) in light of the pandemic. This especially impacted international medical graduates (IMGs) who needed to clear these USMLE examinations to become ECFMG certified. Alternatives to Step 2 CS passing were created late by the ECFMG in the form of 'pathways', for which not all IMGs were eligible. Many of them had spent a considerable portion of their time, effort, and money in preparing for this exam [7]. This affected the plans of thousands of students worldwide aiming to apply to postgraduate clinical training in the US.

Such an impact was also felt in Canada, albeit at a smaller scale due to the fewer number of medical schools compared to the US. The Medical Council of Canada Qualifying Examination (MCCQE) part 1 and part 2 faced numerous rescheduling decisions.

2.5 Multidimensional impact on medical students worldwide

The pandemic impacted multiple strata of the population worldwide; thus, it is only fair to discuss the conditions of medical students from all over the world. The problems faced by medical students in low-and-middle-income countries (LMICs) were even greater than those in high-income countries (HICs). Doctors who were not from high-income countries perceived that the pandemic had a severe impact on

their career specialty, as contrasted with their counterparts from developed nations [8]. As for undertaking surgery, doctors from low and middle-income countries reported feeling inadequately supervised [8].

The situation in war-torn countries, such as Iraq and Libya, was concerning. The ongoing conflicts had already shaken up the sociopolitical stability of the nation, and the subsequent deaths had taken a toll on the medical infrastructure [9]. As the medical infrastructure of war-torn countries “had taken” heavy losses, medical education had proven difficult even before the pandemic. There had been proposals for relying on virtual clinical internships in the developed world, but in poorer countries undergoing warlike situations and civil unrest, such an arrangement was challenging due to weak internet availability [6]. The mere presence of telecommunication and media devices without an internet connection was not enough in such countries [9]. Thus, the question of well-being became confounded for such students as it was hard to determine how much of their distress stemmed from the pandemic and how much from the strife that affected their nation [9]. Previous systematic reviews have highlighted the negative impact of financial restraints and heavy workloads on the medical services being provided in LMICs; the surgical supervision in such states was already lacking before the pandemic [10].

Furthermore, the experienced faculty required to develop online modules for medical classes was busy with the pandemic too. In such dire circumstances, the purpose of online education would have been to provide essential information from the medical curriculum. However, the extraction of essential lessons from the existing medical curricula, its distillation into modules, and the dispersal of the same required a consistent effort from the educators’ end. These educators were busy confronting the ongoing pandemic and alleviating the stress on their country’s medical sector [6]. Educators were also unwilling to switch to online learning platforms because of the learning curve associated with the uptake of new technological means [11].

Lastly, financial difficulties were experienced by students of LMICs and the impact was more noticeable than their western counterparts since the internships and jobs associated with the completion of medical school generally provided a financial safety net to these students [7].

2.6 International students in a foreign country amidst the pandemic

The US, along with other developed nations of the world, enjoys a regular influx of international students each year who move to pursue training from premier institutes. International students are typically willing to learn and adapt to a new lifestyle, alter their beliefs, and spend considerably to accommodate themselves in these countries.

Unfortunately, the impact of COVID-19 on international medical students was notably harsher because of their background, objectives, and expectations. As discussed earlier, medical students generally remain eager to graduate from medical colleges to secure a place within a residency specialty; they enjoy the subsequent financial security associated with the same. However, with the pandemic, such plans were thwarted for all medical students, many of whom had to rely on odd jobs amidst business closures to support their studies. Many international students could not partake in such odd jobs because of their visa restrictions or language restrictions. The grievances of international medical students were further aggravated by the fact that their tuition fees and living expenses were significantly more than that of residential students.

The case of international students presented a unique scenario where they remained stressed about not returning to their home country [6]. The students who

managed to return to their country felt as if their money had been wasted because they practically learned everything online. They also had to synchronize their schedules with the schedule of the class, putting them at a significant disadvantage compared to the local population [6]. The international students who were about to graduate presented another challenge as the effect of the pandemic was felt in the prolongation of their program, thus costing them more in the long run; such financial strains were linked to poor performance on anxiety scales. International students generally look forward to clinical rotations with significant excitement since it is their opportunity to learn more about the culture of their host country, and it gives them an avenue to refine their skills the pandemic rendered that opportunity void [6].

3. Changes in the system and the associated challenges

The problems faced by medical students, as exhibited above, were not exhaustive or comprehensive by any means. Students worldwide continue to suffer general consequences of the pandemic alongside those that are specific to their home country. There have been multiple policy changes and improvements made in the curricula to alleviate some of the stress that is associated with the pandemic; however, the alternatives remain a weak replacement for what the pandemic has taken away. This section will examine a few models that the medical fraternity has proposed to adopt to facilitate pre-clinical and clinical education, as well as the challenges associated with it.

3.1 Technology-Enhanced Learning & Flipped model of education

Even though asynchronous learning was being promoted for more than a decade, students still had been gathering pre-pandemic to have interactive sessions in developed nations. These gatherings and lectures were more marked in developing countries that did not necessarily rely on technology [2]. But technology enhanced learning helped both high and low-middle income nations.

As for improving the educational approaches to ease the impact of COVID-19, a flipped education model proved to be of primary importance whereby the students went over the material before attending an online class to clarify any doubts [6, 7].

In a study done in the UK, clinical students were found to prefer live tutorials, the pre-clinical students preferred video tutorials (pre-recorded) because they were well-structured, and the students could specifically learn what they wanted to learn [12]. In addition, a benefit of online learning was that there were built-in chat mechanisms on various platforms that allowed the participants to ask questions anonymously and directly to the instructor, something that was hard to implement in a physical classroom [12].

In the future, this approach will likely be a key method for medical schools worldwide in delivering didactic education. Virtual recorded lectures allow students to learn at their own time and pace and prevent students' time from being spent up commuting to and from the classroom. However, some disadvantages do exist such as those of decreased interpersonal interaction and lower levels of student motivation.

3.2 Virtual simulations

The impetus of breaking down complex clinical protocols in a systematic manner lay on the educator during virtual learning, and the students had the opportunity to revisit these pre-recorded and live lectures; however, it was a technique that could only supplement in-person training [13]. In other outbreaks, such as SARS, techniques were used to replace in-person clinical rotations with mannequin-based

training and digital games. The expanding horizon of virtual reality presented itself as a potential pathway of the future. The application of wearable gadgets to provide a first-person view of clinical examinations was also explored, which was previously confined to ethnography alone. This was studied in Britain with a physician wearing a point-of-view (POV) camera and carrying out ward-handover and ward-round entry duties [13]. The integration of virtual teaching methods has long been investigated and promoted as being vital to continuing medical education [14].

Similarly, the NHS used Google Glasses to broadcast the UK's first point of view (POV) clinical rotation. England has supplemented its healthcare system and medical education with virtual reality ever since 2019 [15, 16]. These feats remained exciting in themselves but failed to match the essence of in-person training [13]. In some cases, virtual-based medical education has been preferred over real-life clinical practice [15, 16]. Some studies have already testified to the improvement in core competency facilitated by virtual interactions during undergraduate medical education [17, 18]. Clinical demonstrations in the past have been confined to a selected number of students at a time; often, a batch would be split into sub-groups to facilitate equal learning opportunities. The process was even more time-consuming in LMICs where a lack of resources acted as a hindrance towards timely clinical education. However, integrating Virtual Reality Simulation (VRS) into the medical curriculum has allowed educationists to cover a wider student population in a shorter time [19].

The onset of virtual reality in surgical fields has been well documented even before the pandemic [8]; similar technology was applied in the pandemic to facilitate discussion and learning in a risk-free environment. Moreover, a shift towards virtual simulation can have a catalytic effect on the benefits of having virtual meetings, conferences, and mentorships. Virtual conferences provide medical researchers to showcase their research to a wider audience at a reduced registration fee. Similarly, virtual meetings and mentorships provide medical researchers with the opportunity to bridge an equity gap that has existed between students from LMICs and HICs [20]. The onset of VRS has led to medical institutions considering these emerging technologies as a way of administering objective structured clinical examinations (OSCES) to make the process more objective and time-efficient [21].

Virtual simulations can further be digitally saved to facilitate asynchronous learning, whereby students can refer to the material taught at their own pace with due interactive features. Asynchronous learning has been previously shown to improve the retention of knowledge in specific groups [22–24]. Using VRS in medical education allows easy access of clinical scenarios by students on their electronic devices regardless of the geographical location or time zone; each clinical presentation can be modified for any particular group of medical students to adjudge a certain set of clinical skills in isolation [19].

3.3 Increased student participation during COVID-19

With the help of telemedicine, medical students helped those who were chronically ill and required regular check-ins [25]. Such a set-up reduced the chances of transmission and ensured that understaffed clinics would function better as their outpatient volume was mitigated. Besides, patients who did not have COVID-19 were managed by subinterns, thus freeing up the duties of house officers. Medical students could also remotely monitor the conditions of COVID-19 patients with mild symptoms [25]. This was historically in line with how the university of Pennsylvania allowed its medical graduates to treat patients as physicians during the Spanish Flu of 1918. This idea was further propelled by many countries worldwide such as Italy and the United Kingdom, where students graduated early at the promise of serving as frontline workers against COVID-19 [25].

3.4 Future measures after the pandemic

Finally, the medical students who were repositioned to fight the pandemic effectively, need to be supported so that they can develop their core clinical skills. Students who wish to experience overseas placement can take telemedicine opportunities as substitutes. It may help them expand their view about another country's healthcare system.

Additionally, the current pandemic has opened a lucrative and plausible opportunity for medical students to get involved with research and learn more about ethical considerations, public health policy, and how global politics affects the distribution of vaccines [6].

While the classes were made engaging for the students through webcam interface, polls, and chat functions, it remains essential to hold workshops to address the students' concerns about their clinical performance. Such in-person training can tackle the imposter syndrome about clinical experience and its potential effect on medical graduates of the current era [6]. In addition, mockup exercises to effectively deal with epidemic and pandemic situations can be retained in the curricula once the pandemic ends to ensure that physicians remain better equipped for a pandemic in the future.

Teaching basic active relaxation techniques to medical students can prove helpful at such points [6]. Such techniques need to be communicated to the faculty teaching at various medical colleges through respective mental health professionals; furthermore, these techniques need to be passed on to the graduating and incoming students alike. This again presents a challenge for countries where mental health is not considered a proper aspect of medical science and continues to be disregarded [6]. Employing students' help with triage and hotlines in the future can make them feel more valuable and competent; this can tackle their growing sense of imposter syndrome. The success of such skill development programs means that they can be included in typical curricula beyond the pandemic and can help battle pandemic-like situations in the future.

Finally, another key measure to implement after the pandemic is over would be the continuation of mental health support groups. The benefit of curating such support groups would be that they can make students feel inclusive about their imposter syndrome. Moreover, the inclusion of minorities and international students in such groups can lead to better empathetic development of the involved medical students [6]. Remodeling Cognitive Behavioral Therapy will promote effective telemedicinal services [6]. As seen in New Zealand, the idea of support bubbles can be implemented in conjunction with these techniques [26].

4. Conclusions

The COVID-19 pandemic drastically affected the healthcare and educational sectors worldwide; the population discussed within this chapter was placed at the intersection of both. Unfortunately, medical students continue to perform a balancing act between the image of average citizens who can afford to quarantine themselves and the image of physicians in the making with their moral duties lying at the frontline. If this population continues to be neglected during the pandemic, the world risks setting a wrong precedence for the future generations of physicians.

Similarly, there must be consistent effort to bridge the divide between the safety measures available for physicians and those available to medical students. Each medical student deserves to be valued as a future physician: a prized individual beaming with potential. Conversely, failure to safeguard the mental health of future

physicians can act as a deterrent for them to continue within the field and raises concerns about empathetic values within the medical fraternity itself.

Above everything, it has already been demonstrated that medical students were at a higher risk of developing mental problems even before the pandemic began. Questions about the lack of preparedness of countries worldwide have already been raised; questions about the lack of existing mental health resources should also be raised within the medical community. If these resources continue to be limited to senior doctors, who may not access them due to the corresponding stigma [6], then the policies and programs claiming to promote well-being amongst medical students should be called into question.

As recommendations of advisory boards and healthcare bodies continue to evolve, medical students are taking a leap of faith by entrusting their educators with the development of adequate resources and curricula. Such expectations and hopes may not be satisfactory, but they are still more than what a medical student of an LMIC can expect. The advent of virtual reality and the pandemic has provided enough incentive to develop curricula that medical students can access remotely, pre-clinical and clinical alike. Further research within the area will highlight other challenges that medical students faced during the COVID-19 pandemic, especially once it ends.

Acknowledgements

We acknowledge the suggestions made by Dr. Vivek Bhat, which helped enhance the book chapter.

Conflict of interest

The authors declare no conflict of interest.

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